APPENDIX X TO SUBPART B OF PART 430—UNIFORM TEST METHOD FOR MEASURING THE ENERGY CONSUMPTION OF DEHUMIDIFIERS

NOTE: Prior to the compliance date for any amended energy conservation standards that incorporate standby mode and off mode energy consumption, manufacturers may use either Appendix X or Appendix X1 to certify compliance with existing DOE energy conservation standards and to make any representations related to energy consumption of dehumidifiers, with the following exception. If the compliance date is after April 29, 2013, manufacturers that make representations related to standby mode and off mode energy consumption must use Appendix X1 for any representations made after April 29, 2013 of the energy consumption of these products, consistent with the requirements of 42 U.S.C. 6293(c)(2).

After the compliance date for any amended energy conservation standards that incorporate standby mode and off mode energy consumption, all dehumidifiers shall be tested using the provisions of Appendix X1 to certify compliance with amended energy conservation standards and to make any representations related to energy consumption, with the following exception. If the compliance date is before April 29, 2013, manufacturers may use Appendix X for any representations until April 29, 2013 of energy consumption of these products, consistent with the requirements of 42 U.S.C. 6293(c)(2).

1. *Scope:* This appendix covers the test requirements used to measure the energy performance of dehumidifiers.

2. *Definitions:*

a. *Product capacity for dehumidifiers* means a measure of the ability of a dehumidifier to remove moisture from its surrounding atmosphere, measured in pints collected per 24 hours of continuous operation.

b. *Energy factor for dehumidifiers* means a measure of energy efficiency of a dehumidifier calculated by dividing the water removed from the air by the energy consumed, measured in liters per kilowatt hour (L/kWh).

3. *Test Apparatus and General Instructions:* The test apparatus and instructions for testing dehumidifiers shall conform to the requirements specified in section 1, ''Definitions,'' section 2, ''Qualifying Products,'' and section 4, ''Test Criteria,'' of the EPA's ''ENERGY STAR Program Requirements for Dehumidifiers,'' effective January 1, 2001 (Incorporated by reference, see §430.22). Record measurements at the resolution of the test instrumentation. Round off calculations to the same number of significant digits as the previous step. Round the final minimum energy factor value to two decimal places as follows:

(i) A fractional number at or above the midpoint between two consecutive decimal places shall be rounded up to the higher of the two decimal places; or

(ii) A fractional number below the midpoint between two consecutive decimal places shall be rounded down to the lower of the two decimal places.

4. *Test Measurement:* Measure the energy factor for dehumidifiers, expressed in liters per kilowatt hour (L/kWh) and product capacity in pints per day (pints/day), in accordance with the test requirements specified in section 4, ''Test Criteria,'' of EPA's ''ENERGY STAR Program Requirements for Dehumidifiers,'' effective January 1, 2001 (Incorporated by reference, see §430.22).

[71 FR 71366, Dec. 8, 2006, as amended at 77 FR 65995, Oct. 31, 2012]

APPENDIX X1 TO SUBPART B OF PART 430–UNIFORM TEST METHOD FOR MEASURING THE ENERGY CONSUMPTION OF DEHUMIDIFIERS

NOTE: Prior to the compliance date for any amended energy conservation standards that incorporate standby mode and off mode energy consumption, manufacturers may use either Appendix X or Appendix X1 to certify compliance with existing DOE energy conservation standards and to make any representations related to energy consumption of dehumidifiers, with the following exception. If the compliance date is after April 29, 2013, manufacturers that make representations related to standby mode and off mode energy consumption must use Appendix X1 for any representations made after April 29, 2013 of the energy consumption of these products, consistent with the requirements of 42 U.S.C. 6293(c)(2).

After the compliance date for any amended energy conservation standards that incorporate standby mode and off mode energy consumption, all dehumidifiers shall be tested using the provisions of Appendix X1 to certify compliance with amended energy conservation standards and to make any representations related to energy consumption, with the following exception. If the compliance date is before April 29, 2013, manufacturers may use Appendix X for any representations until April 29, 2013 of energy consumption of these products, consistent with the requirements of 42 U.S.C. 6293(c)(2).

1. SCOPE

This appendix covers the test requirements used to measure the energy performance of dehumidifiers.

2. DEFINITIONS

2.1 ANSI/AHAM DH–1 means the test standard published by the American National Standards Institute and the Association of Home Appliance Manufacturers, titled ''Dehumidifiers,'' ANSI/AHAM DH–1–2008, (incorporated by reference; see §430.3).

2.2 *Active mode* means a mode in which a dehumidifier is connected to a mains power source, has been activated, and is performing the main functions of removing moisture from air by drawing moist air over a refrigerated coil using a fan, or circulating air through activation of the fan without activation of the refrigeration system.

2.3 *Combined low-power mode* means the aggregate of available modes other than active mode.

2.4 *Energy factor for dehumidifiers* means a measure of energy efficiency of a dehumidifier calculated by dividing the water removed from the air by the energy consumed, measured in liters per kilowatt-hour (L/kWh).

2.5 *IEC 62301* means the test standard published by the International Electrotechnical Commission, titled ''Household electrical appliances—Measurement of standby power,'' Publication 62301 (Edition 2.0 2011–01) (incorporated by reference; see §430.3).

2.6 *Inactive mode* means a standby mode that facilitates the activation of active mode by remote switch (including remote control), internal sensor, or timer, or that provides continuous status display.

2.7 *Off mode* means a mode in which the dehumidifier is connected to a mains power source and is not providing any active mode or standby mode function, and where the mode may persist for an indefinite time. An indicator that only shows the user that the dehumidifier is in the off position is included within the classification of an off mode.

2.8 *Off-cycle mode* means a standby mode in which the dehumidifier:

(1) Has cycled off its main function by humidistat or humidity sensor;

(2) Does not have its fan or blower operating; and

(3) Will reactivate the main function according to the humidistat or humidity sensor signal.

2.9 *Product capacity for dehumidifiers* means a measure of the ability of the dehumidifier to remove moisture from its surrounding atmosphere, measured in pints collected per 24 hours of continuous operation.

2.10 *Standby mode* means any modes where the dehumidifier is connected to a mains power source and offers one or more of the following user-oriented or protective functions which may persist for an indefinite time:

(1) To facilitate the activation of other modes (including activation or deactivation of active mode) by remote switch (including remote control), internal sensor, or timer;

(2) Continuous functions, including information or status displays (including clocks) or sensor-based functions. A timer is a continuous clock function (which may or may not be associated with a display) that provides regular scheduled tasks (*e.g.*, switching) and that operates on a continuous basis.

3. TEST APPARATUS AND GENERAL INSTRUCTIONS

3.1 *Active mode.* The test apparatus and instructions for testing dehumidifiers shall conform to the requirements specified in Section 3, ''Definitions,'' Section 4, ''Instrumentation,'' and Section 5, ''Test Procedure,'' of ANSI/AHAM DH–1 (incorporated by reference, see §430.3). Record measurements at the resolution of the test instrumentation. Round off calculations to the same number of significant digits as the previous step. Round the final minimum energy factor value to two decimal places as follows:

(i) A fractional number at or above the midpoint between two consecutive decimal places shall be rounded up to the higher of the two decimal places; or

(ii) A fractional number below the midpoint between two consecutive decimal places shall be rounded down to the lower of the two decimal places.

3.2 *Standby mode and off mode.*

3.2.1 *Installation requirements.* For the standby mode and off mode testing, the dehumidifier shall be installed in accordance with Section 5, Paragraph 5.2 of IEC 62301 (incorporated by reference, see §430.3), disregarding the provisions regarding batteries and the determination, classification, and testing of relevant modes.

3.2.2 *Electrical energy supply.*

3.2.2.1 *Electrical supply.* For the standby mode and off mode testing, maintain the electrical supply voltage and frequency indicated in Section 7.1.3, ''Standard Test Voltage,'' of ANSI/AHAM DH–1, (incorporated by reference, see §430.3). The electrical supply frequency shall be maintained ±1 percent.

3.2.2.2 *Supply voltage waveform.* For the standby mode and off mode testing, maintain the electrical supply voltage waveform indicated in Section 4, Paragraph 4.3.2 of IEC 62301, (incorporated by reference; see §430.3).

3.2.3 *Standby mode and off mode watt meter.* The watt meter used to measure standby mode and off mode power consumption shall meet the requirements specified in Section 4, Paragraph 4.4 of IEC 62301 (incorporated by reference, see §430.3).

3.2.4 *Standby mode and off mode ambient temperature.* For standby mode and off mode testing, maintain room ambient air temperature conditions as specified in Section 4, Paragraph 4.2 of IEC 62301 (incorporated by reference; see §430.3).

4. TEST MEASUREMENT

4.1 *Active mode.* Measure the energy factor for dehumidifiers, expressed in liters per kilowatt hour (L/kWh) and product capacity in pints per day (pints/day), in accordance with the test requirements specified in Section 7, ''Capacity Test and Energy Consumption Test,'' of ANSI/AHAM DH–1 (incorporated by reference, see §430.3).

4.2 *Standby mode and off mode.* Establish the testing conditions set forth in section 3.2 of this appendix, ensuring that the dehumidifier does not enter active mode during the test. For dehumidifiers that take some time to enter a stable state from a higher power state as discussed in Section 5, Paragraph 5.1, Note 1 of IEC 62301, (incorporated by reference; see §430.3), allow sufficient time for the dehumidifier to reach the lower power state before proceeding with the test measurement. Follow the test procedure specified in Section 5, Paragraph 5.3.2 of IEC 62301 for testing in each possible mode as described in sections 4.2.1 and 4.2.2 of this appendix.

4.2.1 If the dehumidifier has an inactive mode, as defined in section 2.6 of this appendix, but not an off mode, as defined in section 2.7 of this appendix, measure and record the average inactive mode power of the dehumidifier, P_{IA}, in watts. Otherwise, if the dehumidifier has an off mode, as defined in section 2.7 of this appendix, measure and record the average off mode power of the dehumidifier, P_{OM}, in watts.

4.2.2 If the dehumidifier has an off-cycle mode, as defined in section 2.8 of this appendix, measure and record the average off-cycle mode power of the dehumidifier, P_{OC}, in watts.

5. CALCULATION OF DERIVED RESULTS FROM TEST MEASUREMENTS

5.1 *Annual combined low-power mode energy consumption.* Calculate the annual combined low-power mode energy consumption for dehumidifiers, E_{TLP}, expressed in kilowatt-hours per year, according to the following:

$E_{TLP} = [(P_{IO} \times S_{IO}) + (P_{OC} \times S_{OC})] \times K$

Where:

$P_{IO} = P_{IA}$, dehumidifier inactive mode power, or P_{OM}, dehumidifier off mode power, in watts, as measured in section 4.2.1 of this appendix.

P_{OC} = dehumidifier off-cycle mode power, in watts, as measured in section 4.2.2 of this appendix.

S_{IO} = 1840,5 dehumidifier inactive mode or off mode annual hours.

S_{OC} = 1840,5 dehumidifier off-cycle mode annual hours.

K = 0.001 kWh/Wh conversion factor for watt-hours to kilowatt-hours.

5.2 *Integrated energy factor.* Calculate the integrated energy factor, IEF, expressed in liters per kilowatt-hour, rounded to two decimal places, according to the following:

$IEF = L_W/(E_{active} + ((E_{TLP} \times 24)/S_{active}))$

Where:

L_W = water removed from the air during dehumidifier energy factor test, in liters, as measured in section 4.1 of this appendix.

E_{active} = dehumidifier energy factor test energy consumption, in kilowatt-hours, as measured in section 4.1 of this appendix.

E_{TLP} = standby mode and off mode annual energy consumption, in kilowatt-hours per year, as calculated in section 5.1 of this appendix.

24 = hours per day.

S_{active} = 1,095, dehumidifier active mode annual hours.

[77 FR 65995, Oct. 31, 2012]

APPENDIX Y TO SUBPART B OF PART 430—UNIFORM TEST METHOD FOR MEASURING THE ENERGY CONSUMPTION OF BATTERY CHARGERS

The provisions of this appendix are effective on the compliance date of any energy conservation standard for battery chargers.

1. SCOPE

This appendix covers the test requirements used to measure battery charger energy consumption for battery chargers operating at either DC or United States AC line voltage (115V at 60Hz).

2. DEFINITIONS

The following definitions are for the purposes of explaining the terminology associated with the test method for measuring battery charger energy consumption.[1]

2.1. *Active mode* or *charge mode* is the state in which the battery charger system is connected to the main electricity supply, and the battery charger is delivering current, equalizing the cells, and performing other one-time or limited-time functions in order to bring the battery to a fully charged state.

2.2. *Active power* or *real power* (P) means the average power consumed by a unit. For a two terminal device with current and voltage waveforms i(t) and v(t), which are periodic with period T, the real or active power P is:

$$P = \frac{1}{T}\int_0^T v(t)i(t)dt$$

2.3. *Ambient temperature* is the temperature of the ambient air immediately surrounding the unit under test.

[1] For clarity on any other terminology used in the test method, please refer to IEEE Standard 1515–2000.